

AutoVent 2t

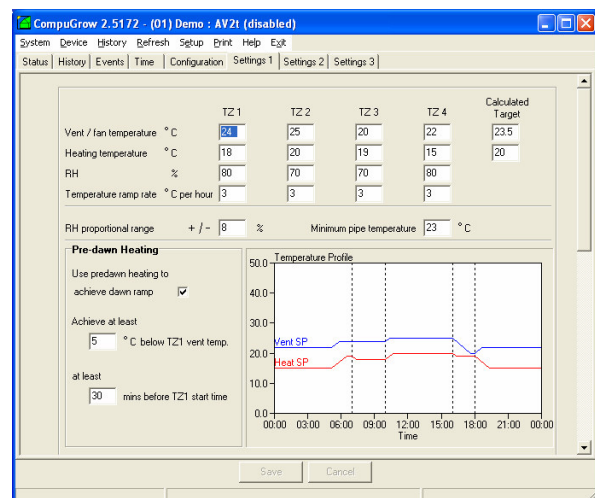
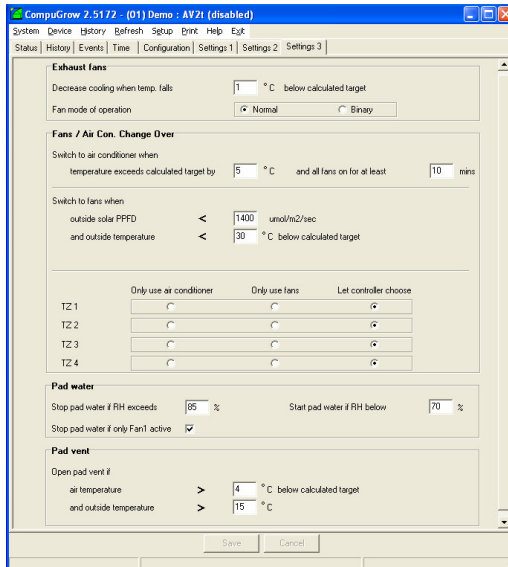
Features

- Suits fan vented greenhouses and grow rooms up to 3 fan groups
- Fan groups can operate in simple three set-point mode or in binary weighted mode to give 8 effective levels of fan cooling
- Evaporative cooling using wet-wall (pad)
- Three levels of shade control (inside/outside)
- Fogging – pump plus 4 zones
- Stir fan
- CO₂ injection
- Auto switch over to air-con
- Dehumidifier
- Blackout/Lighting control
- Full manual overrides
- PC interface with remote setting, data logging, event logs, remote access etc etc



Venting

The AutoVent 2t will control up to three fan banks (or variable speed fans) together with air inlet vent and water evaporative cooling. The air inlet can be set to open at a lower temperature to give some small amount of ventilation before the need to switch on the fans.



The extraction fans can be set up as a simple three bank system each with its own set-point offset or else they can be set to operate in a binary weighted mode. To achieve this, fan bank 2 must be twice as powerful as fan bank 1 and fan bank 3 twice as powerful as fan bank 2. Then the controller can select various combinations of fans to get exactly the correct amount to hold the temperature at the set level. With this method, eight levels of fan cooling can be achieved with only three fan banks.



Fan bank one operates according to the effective set-point for each time zone whilst Fans 2 and 3 operate at user set offsets from the base set-point (eg + 1.5°C and + 3°C) At a sudden change in temperature the controller will move quickly to the switch on appropriate larger fan bank and then take a little more time to adjust the lesser fans to suit. Three set-points are provided in the pursuit of economy so that the bigger fan banks, which are obviously more costly to run, will only operate when absolutely necessary. The offset for each bank may be set to suit the crop to achieve a sensible balance between optimal temperature and economy.

The advanced venting/heating algorithm will try to control both temperature AND relative humidity by varying the venting/heating setpoints within user set bounds. Intelligent use is made of the fans and pad water to achieve the desired temperature and humidity. In addition, if the fans and pad are unable to control the temperature satisfactorily, the shading will try to assist and if this is still not successful the system will automatically switch over to air conditioning control(if fitted) or roof sprinklers.

Air Conditioner

As an option, an air conditioner may be installed. This is only used after every attempt has been made to control temperature by fans and/or evaporative cooling

Heating

Air heating can be by either proportional control or ON/OFF control. Proportional control is normally used in conjunction with a boiler heating water pipes. This provides a very gentle heat and the heating pipes can be positioned either under the grow beds or between the rows of plants. In this way less heat need be supplied as compared with general warm-air heating. Water pipe heating is gentle, economical and avoids sudden drying of the air.

The heating is used to control both the temperature and the relative humidity.

Fogging

Fogging may be used to assist with cooling or to increase humidity in dry weather. Five outputs are used; one that comes on constantly while fogging is called for and the remaining four that pulse on for short periods to inject puffs of fog to each zone in turn. The size of the puffs of fog is automatically varied depending on the size of the error that it is trying to correct. For example, if the temperature is just a little too high, then small puffs of fog will be generated whilst if the temperature is a lot too high then larger puffs will result.

Stirring fans

A single stage of stirring is provided as standard but this is increased to two zones if the output expander is fitted. Stirring fans are normally set to come on whenever the exhaust fans are off, when humidity is excessive, when injecting CO₂ or when fogging.



Shading

Two stages of shading are available together with a thermal screen. Often one shade will be external and the second internal. The external one is usually of heavy duty material and does not introduce any heat into the greenhouse. Wind and rain overrides may be set to automatically retract this shade. Normally the shades operate to maintain the light level below a user set maximum. If the maximum light level is exceeded the appropriate shade (or both) will start to close immediately but once closed requires the light to remain below the setpoint for at least the time specified by the user. When changing from one shade to the other, the rule followed is always "close before opening" in order to protect delicate plants.

The thermal screen may be used to trap the radiant heat in the lower part of the greenhouse and effectively provides "reflective double glazing" but only when cold or when set to close for a particular time zone. The shades can be set to "crack" open a little if high humidity is encountered.

Purging

In the event of very high humidity, the controller can be programmed to go into a purging mode. In this mode it increases the heating temperature by a few degrees (user set) to try to dry the air. Eventually the humidity will creep up again due to plant transpiration and the controller will crack the shade/thermal screens and switch on an exhaust fan for a few seconds (user set) to exhaust the warm humid air. Then the vents will close and the heater will again warm and dry the fresh air. This purging cycle will continue until the humidity is brought under control. If a dehumidifier is installed then purging is not normally used

Dehumidifier

An alternative strategy to reduce humidity is to use a dehumidifier. This is particularly useful when CO₂ injection is used as it avoids venting to remove humidity.

Optional CO₂

CO₂ is measured and injected providing 1) there is sufficient light, 2) the fans are off or 3) the fans are below a set limit. The user may specify any desired level of CO₂ from 0 to 2000ppm and the system will try to provide this when appropriate.

PC interface

The optional PC interface allows the settings to be viewed and set from the user-friendly Compugrow software. It also facilitates the collection of measured data and events from the controller for logging to the hard drive whence it may be displayed graphically for ease of interpretation. The computer interface also allows for alarms to sound at the PC (via the PC sound card) or even be auto-dialled out to a telephone or pager (via the PC MODEM). If remote access software is installed (eg PCAnywhere) the PC and hence the controller may be accessed from anywhere in the world (password protected of-course)



Specification

Dimensions

Main controller 300mm x 300mm x 190mm - 5.5Kg. IP 67 rated enclosure except for bottom cable entry.

Optional output expansion module 225mm x 150mm x 75mm - 1.1Kg

Outputs

24V AC 2 amp surge, 1 amp continuous. All outputs opto-isolated and surge protected, zero voltage switched

Inputs

All inputs are via three opto-isolated RS485 busses

All settings are stored in permanent (non-volatile) memory on the controller, Clock is battery backed.

Communication busses maximum length 1200m, daisy chain configuration with end terminators.

Weather station and Enviro sensors

Temperature accuracy 0.2°C sensors used, total accuracy +/- 0.5°C

RH sensors +/- 2% to 95% then +/- 5%

Solar sensors approximate PAR. Accuracy +/- 10%

Wind sensors have long life bearings

Rain gauge resolution to 1mm rainfall (can be calibrated)

Rain sensor – capacitive style – sensitivity not affected by purity of rain water - activates between 3 – 4 drop water from standard eye dropper.